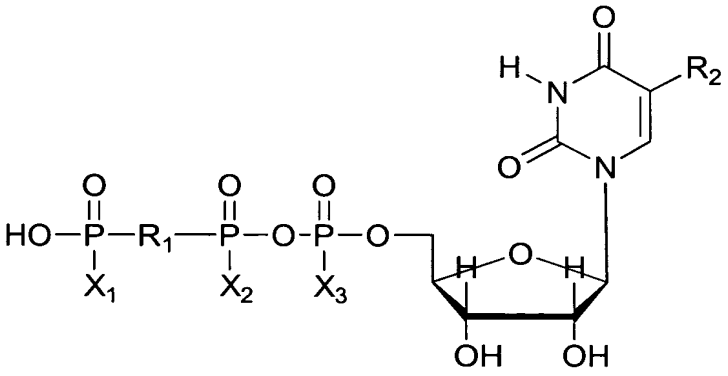
WHAT IS CLAIMED IS:

1. A method of stimulating tear secretion and mucin production in eyes comprising the step of administering to the eyes an effective amount of a preparation which includes a compound selected from a group consisting of uridine 5'-triphosphate and derivatives as depicted in Formula I, dinucleotides as depicted in Formulae II, II(a) and II(b), adenosine 5'-triphosphate derivatives as depicted in Formula III, and cytidine 5'-triphosphate derivatives as depicted in Formula IV, and their pharmaceutically acceptable salts; and

a physiologically compatible vehicle selected from the group consisting of aqueous electrolyte solutions, polyethers, polyvinyls, polymers of acrylic acid, lanolin, and glucosaminoglycans;

whereby said preparation promotes tear secretion and mucin production in the eyes in a subject in need of such treatment:

FORMULA I



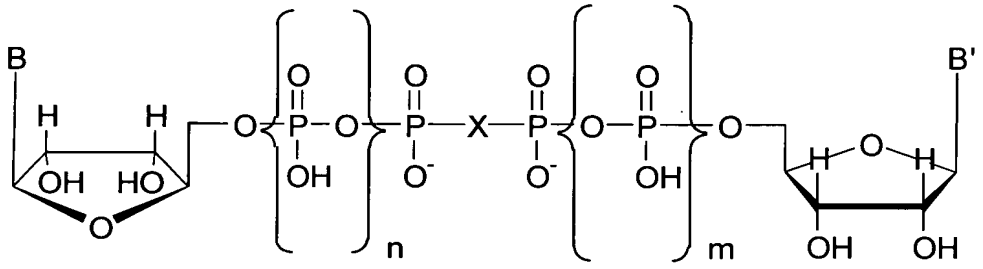
wherein:

X_1, X_2 and X_3 are each independently either O^- or S;

R_1 is O, imido, methylene or dihalomethylene;

R_2 is H or Br;

FORMULA II



wherein:

X is oxygen, imido, methylene or difluoromethylene;

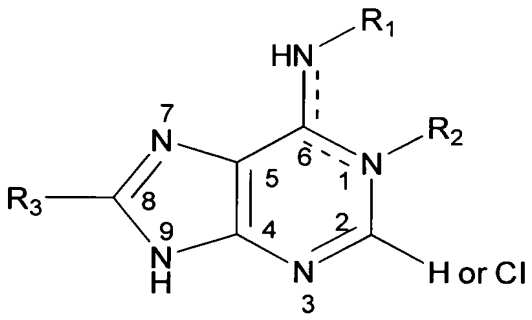
n = 0 or 1;

m = 0 or 1;

n + m = 0, 1 or 2; and

B and B' are each independently a purine residue, as in Formula IIa, or a pyrimidine residue, as in Formula IIb, linked through the 9- or 1-position, respectively:

FORMULA IIa



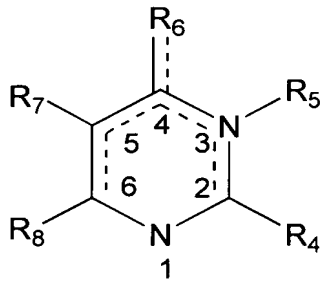
wherein:

R_3 is NHR_1;

R_1 of the 6- or 8-HNR_1 groups is chosen from the group consisting of hydrogen, arylalkyl (C_{1-6}) groups; and alkyl groups with functional groups selected from the group consisting of ([6-aminohexyl]carbamoylmethyl)-, ω-acylated-amino(hydroxy, thiol or carboxy)alkyl(C_{2-10})- and ω-acylated-amino (hydroxy, thiol or carboxy) derivatives where

the acyl group is chosen from the group consisting of acetyl, trifluroacetyl, benzoyl, and substituted-benzoyl;

FORMULA IIb



wherein:

R_4 is hydroxy, mercapto, amino, cyano, aralkoxy, C_{1-6} alkoxy, C_{1-6} alkylamino or dialkylamino, with the alkyl groups optionally linked to form a heterocycle;

R_5 is hydrogen, acyl, C_{1-6} alkyl, aroyl, C_{1-5} alkanoyl, benzoyl, or sulphonate;

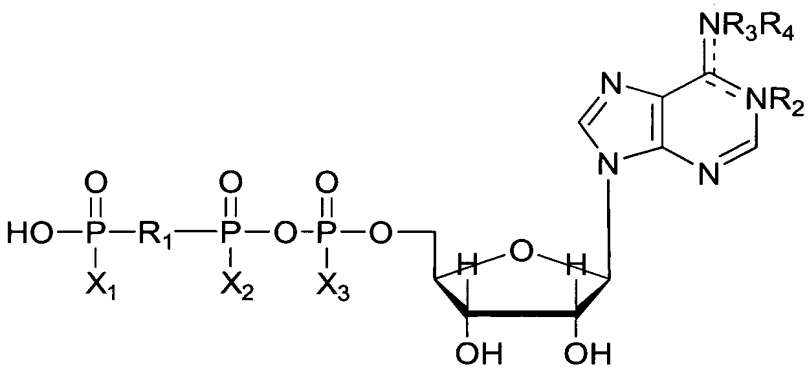
R_6 is hydroxy, mercapto, alkoxy, aralkoxy, C_{1-6}-alkylthio, C_{1-5} disubstituted amino, triazolyl, alkylamino or dialkylamino, where the alkyl groups are optionally linked to form a heterocycle or linked to N^3 to form an optionally substituted ring;

R_7 is hydrogen, hydroxy, cyano, nitro, alkenyl with the alkenyl moiety optionally linked through oxygen to form a ring optionally substituted on the carbon adjacent to the oxygen with alkyl or aryl groups, substituted alkynyl, halogen, alkyl, substituted alkyl, perhalomethyl, C_{2-6} alkyl, C_{2-3} alkenyl, or substituted ethenyl, C_{2-3} alkynyl or substituted alkynyl;

or together $R_6 - R_7$ form a 5 or 6-membered saturated or unsaturated ring bonded through N or O at R_6, such a ring optionally contains substituents that themselves contain functionalities; provided that when R_8 is amino or substituted amino, R_7 is hydrogen; and

R_8 is hydrogen, alkoxy, arylalkoxy, alkylthio, arylalkylthio, carboxamidomethyl, carboxymethyl, methoxy, methylthio, phenoxy or phenylthio;

FORMULA III



wherein:

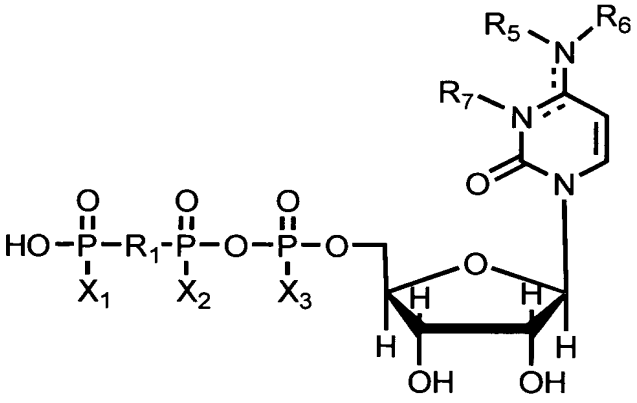
R_1, X_1, X_2 and X_3 are defined as in Formula I;

R_3 and R_4 are H while R_2 is nothing and there is a double bond between N-1 and C-6, or

R_3 and R_4 are H while R_2 is O and there is a double bond between N-1 and C-6, or

R_3, R_4 and R_2 taken together are -CH=CH-, forming a ring from N-6 to N-1 with a double bond between N-6 and C-6;

FORMULA IV



wherein:

R_1, X_1, X_2 and X_3 are defined as in Formula I;

R_5 and R_6 are H while R_7 is nothing and there is a double bond between N-3 and C-4, or

R_5, R_6 and R_7 taken together are -CH=CH-, forming a ring from N-3 to N-4 with a double bond between N-4 and C-4 optionally substituted at the 4- or 5-position of the etheno ring.

2. A method according to Claim 1, wherein said administration involves topical administration of said compound via a carrier vehicle selected from a group consisting of drops of liquid, liquid wash, gels, ointments, sprays and liposomes.

3. A method according to Claim 2, wherein said topical administration comprises infusion of said compound to said ocular surface via a device selected from a group consisting of a pump-catheter system, a continuous or selective release device, and a contact lens.

4. A method according to Claim 1, wherein said administration involves systemic administration of said compound by administering a liquid/liquid suspension of said compound via nose drops or nasal spray or nebulized liquid to oral or nasopharyngeal airways of said subject, such that a therapeutically effective amount of said compound contacts the lacrimal tissues of said subject via systemic absorption and circulation.

5. A method according to claim 1, wherein said systemic administration of said compound is accomplished by administering an oral form of said compound, such that a therapeutically effective amount of said compound contacts the lacrimal tissues of said subject via systemic absorption and circulation.

6. A method according to claim 4, wherein said systemic administration of said compound is accomplished by administering an injectable form of said compound, such that a therapeutically effective amount of said compound contacts the lacrimal tissues of said subject via systemic absorption and circulation.

7. A method according to claim 4, wherein said systemic administration of said compound is accomplished by administering a suppository form of said compound,

such that a therapeutically effective amount of said compound contacts the lacrimal tissues of said subject via systemic absorption and circulation.

8. A method according to claim 4, wherein said systemic administration of said compound is accomplished by administering an intra-operative instillation of a gel, cream, powder, foam, crystals, liposomes, spray or liquid suspension form of said compound, such that a therapeutically effective amount of said compound contacts the lacrimal tissues of said subject via systemic absorption and circulation.

9. A method according to Claim 1, wherein said compound is administered in an amount sufficient to achieve concentrations thereof on the ocular surfaces of said subject of from about 10^{-7} to about 10^{-1} moles/liter.

10. A method of stimulating tear secretion and mucin production in eyes comprising the step of administering to the eyes an effective amount of P^1, P^4-di(uridine-5')-tetraphosphate.

11. A method of treating dry eye diseases comprising the step of administering to the eyes an effective amount of P^1, P^4-di(uridine-5')-tetraphosphate.

12. A method of treating corneal injury comprising the step of administering to the eyes an effective amount of P^1, P^4-di(uridine-5')-tetraphosphate.